

SUPPORT FOR THE HYDRAULIC MODEL OF INTRA-PERITONEAL PRESSURE: EFFECT OF PATIENT POSITIONING ON INTRA-ABDOMINAL PRESSURE MONITORING

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Purpose: Intra-abdominal hypertension (IAH) is recognized as a critical physiologic parameter affecting multiple organ systems. Simple continuous monitoring techniques for intraabdominal pressure (IAP) have been introduced but currently require supine positioning (SP) for standardized measurement. However, SP of ICU patients may jeopardize patient safety by increasing the risk for ventilator associated pneumonia. We therefore evaluated the relationship between IAP and head-of-bed (HOB) positioning in critically ill intubated patients.

Methods: IAP measurements were performed using 18 Fr triple lumen intra-vesical catheters with manometry zeroed at the symphysis pubis. IAP was measured in a range of patient HOB elevations (0°, 10°, 20°, 30°, 45°). Multi-variable generalized estimating equation (GEE) modeling was performed to describe the relationship of IAP and HOB positioning with adjustment for age, body mass index (BMI), PEEP, temperature, Riker score, and diagnostic category.

Results: Three hundred (300) observations were performed on 37 patients. Mean (\pm SD) age was 55 \pm 16 years. Primary diagnosis was considered medical in 54%, surgical in 22%, traumatic in 16% and neurological in 8%. Mean (\pm SD) BMI was 30 \pm 13. In multivariable modeling, HOB elevation was significantly associated with IAP. Model predicted differences (95% CI) between IAP at 0° and 10° was 1.2 (0.1 – 2.3) mm Hg; between 0° and 20° was 2.9 (1.8 – 4) mm Hg; between 0° and 30° was 5.0 (3.8, 6.1) mm Hg; and between 0° and 45° was 7.4 (6.3, 8.5) mm Hg. BMI, PEEP, temperature and diagnostic category were significant in this model while age and Riker sedation score were not.

Conclusions: IAP pressure in the critically ill is significantly associated with HOB positioning even after controlling for other predictors providing a rationale for future corrective models to allow simple continuous IAP estimation without requiring SP. Clinically relevant changes in IAP occur at HOB elevations above 20°.